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NAVAL WAR COLLEGE
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INNOVATIONS FOR NAVY WAR GAMING IN THE 1980'S

by

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A paper submitted for the Vice Admiral Julien J.
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The contents of this paper reflect my own personal
views and are not necessarily endorsed by the Naval War
College or the Department of the Navy.

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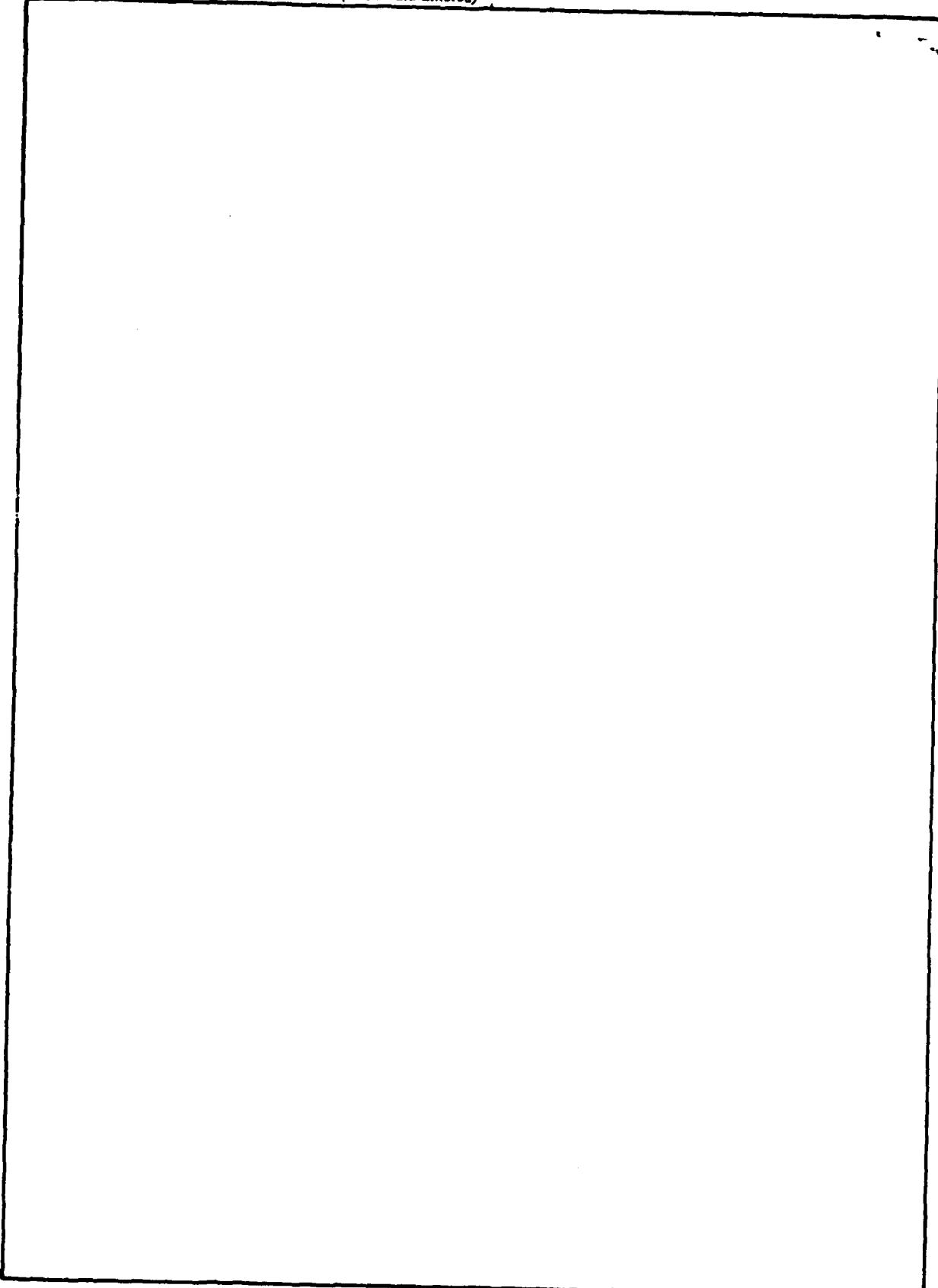252900

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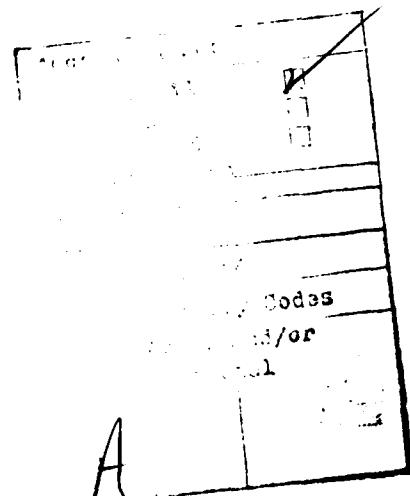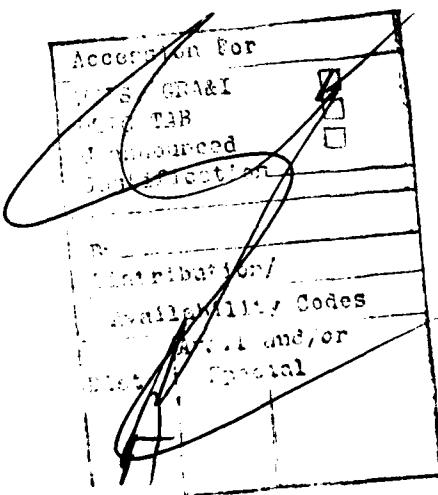innovative concepts that are presented.

ii

PREFACE

Simulation of war can never <u>perfectly</u> represent a real conflict. Close coordination between real world decision makers and designers of simulations can, however, produce war games that will <u>accurately</u> portray the outcomes of tactical and strategic decisions.

The key to war gaming is the combination of real world force employment experience with mathematical simulation expertise. I have trained and practiced in <u>both</u> these arenas. My experience has been limited to land combat and land war gaming, but I have appreciated the opportunity to explore the dimensions of Navy war gaming for the 1980's.

As an "outsider," I hope my ideas are beneficial to the execution of the Navy's responsibility for defense of the United States of America.

TABLE OF CONTENTS

INNOVATIONS FOR NAVY WAR GAMING IN THE 1980'S

CHAPTER I

INTRODUCTION

During the decade of the 1980's, the Navy will celebrate
one hundred years of war gaming at the Naval War College.
Quantum increases in sophistication have occurred since
Lieutenant William McCarty Little delivered his first lec-
ture. In fact, as we enter this decade we find that com-
puters and color video displays are increasingly supporting
and supplementing the decisions of the war gamers. This
type support has given us: more time to think before making
our strategic or tactical decisions, more information on
which to make our decisions, more variables modeled and
evaluated, and instantaneous aggregation of outcomes. We
almost don't have time for a cup of coffee between decisions.

The purpose of adding this computer and color video dis-
play support was not to displace the decision makers but
rather to provide them with better and more realistic out-
comes based on their decision variables. It is commendable
that during the last one hundred years we have not lost sight
of our original war gaming objective: simulate war to evalu-
ate the impact of decisions.

With increased sophistication and added capabilities,
the 1980's will provide us with bigger and faster machines

1

capable of handling more variables and reducing the time
required to give us our results. In spite of these advances,
we will not be able to completely simulate all the variables
of war. We can, however, employ our capabilities in some
innovative ways so that the ultimate purpose of war gaming
can be achieved. Our ultimate purpose is to gain insight
into the very complex interaction of the elements of war.

CHAPTER II

INNOVATIONS FOR WAR GAMING AND SIMULATION PERSONNEL

War games and computer simulations are not widely
trusted by decision makers. This distrust is the fault of
the personnel who have the responsibility to plan, control
and develop all simulations of war from the "all human" con-
flict game to the fully computerized one-on-one duel engage-
ment. The distrust stems from the parochialism that has
built up between those who advocate analytical simulations
and those that favor human decision making games. This
latter group even taunts decision makers with statements
such as "This is not an analytical game." By attempting to
separate war gaming into two artificially unrelated parts,
both groups have created doubts among decision makers as to
the utility of the separate efforts.

Those that espouse human decision making games point
out that analytical simulations are devoid of the human ele-
ment or at best the human factor is treated only probabilis-
tically. Those who push for analytical simulations see the
human decision maker as a possible negator of the true capa-
bilities of weapon systems because of possible misinformation
or staid, archaic employment doctrines. Surely there is a
balance between these two camps and for the 1980's our ini-
tiatives should be keyed to combining the strong attributes

of both techniques into an amalgamation that leads to a single war gaming discipline.

While an initiative in this area will be considered by some to be invalid ("we do it already") or purported to be easily solved ("ok, we are now together"), the fact remains that the "we" of analytical simulation must couple with the "they" of human gaming to produce an "us" that can employ war gaming techniques to the many pressing problems of today's and tomorrow's Navy—a Navy that must be structured and employed now to perform its mission.

Navy leadership will experience no rush to consolidate techniques because each camp is convinced that its type of war gaming is the best, the most realistic, and the most appropriate for use. Continuous interaction between the human game advocates of the Naval War College with the Center of Naval Analysis analytical experts and the simulation efforts of other Navy bureaus and the Navy Postgraduate School can produce a viable Navy war gaming discipline for the 1980's.

Once all personnel are "steaming on the same course," they need to begin a concerted program to account for the impact of the environment on all war game results. The Navy war environment consists of man-controlled weapon systems operating in the fog, rain, snow or sunshine. They are employed in all levels of light conditions and in a water and air medium that varies in temperature extremes and sea

4

states. The systems also react with and to each other through both visual and nonvisual communications means that can be degraded by man and by nature. The "Orange Force" is also part of the environment. We have abundant material on his tactics and equipment capabilities. His performance should not be mistreated by gross simplification as a benign aggressor.

Our war games must consider these factors and the results should show the sensitivity to these effects. We have the knowledge and equipment to simulate these environmental factors. Our goal should be to quit operating war games that cannot "handle" these factors. We are past the point where today's decision makers can gain beneficial insight to problems from war games that provide unlimited flying conditions for aircraft, unlimited logistics which are instantly transported and transferred to the battle, or ASW games that are not sensitive to temperature gradient and do not portray the interaction between air, surface, and subsurface ASW platforms.

CHAPTER III

INNOVATIONS FOR THE NAVAL WAR COLLEGE CURRICULUM

General. The Naval War College curriculum centers
around education but is also an opportunity to enhance the
training of Navy leadership. War gaming can enhance both
the educational and training benefits of the War College if
the games consider an operational environment based on a
realistic appraisal of the capabilities which we, and pos-
sible adversaries, will have tomorrow, in the near future,
or in the next century. The co-location of the Navy's
Center for War Gaming with the College facilitates opportun-
ities for the students and for the Navy.

Unstructured Time Alternative. Interactive gaming
terminals should be employed throughout the student cubicle
study area. These terminals, with basic instruction books
and a catalogue of basic games, would provide the student
an option for his unstructured time and simultaneously en-
hance the educational aspects of any course--in essence, a
"tap into the student's individual initiative." With a wide
variety of simulations/games packaged for this man-vs.-
machine system, the new War College computer could serve as
the "scorekeeper." Options could also be included for man-
vs.-man gaming after the students honed their individual
tactical and strategic force employment options.

A basic ASW search problem in an open ocean, outside of land-based air range, could easily be gamed. The student could be given a set of Blue forces and then develop his own employment options to accomplish the ASW mission against a given Orange threat. A follow-on function could permit a change in the size of the Blue forces; another could change within reasonable bounds the parameters of the Blue ASW capabilities. This same system could also provide training in opposing force tactics and strategies and familiarize students with opposing force equipment and capabilities. Interactive gaming is available at many other facilities and could be made available at the War College for little additional cost. The learning that would be gained during the student's unstructured time could be invaluable. It would sharpen skills of resource allocation, force planning, tactical employment and decision making under uncertainty.

"ASW in the open ocean" is just one of the games that would be available. Others include submarine operations, air superiority, convoy protection, anti-air defense, mine and countermine operations, barriers and operations in straits, fiords, etc. Because of computer time availability, all of these programs could be simplified but should be as realistic as possible with at least: constraints on logistics (i.e., no unlimited asset games), imperfect information flow (EW

7

environment), and realistic results of combat losses (i.e., not perfect information on friendly or enemy damage).

If such a system of games and terminals were properly designed and made available, its use would be quickly over-subscribed. This system would help the students visualize the impact of variations in parameters/capabilities of the forces they are being trained/educated to command. Those who don't subscribe to this need only to ask professional experienced officers what impact a 10% increase in capabilities will have on force employment and tactics. By and large, they will not be able to articulate the impact of marginal capability increases of either a single ship, aircraft, task force or an entire fleet.

Scenario Production. Current policy at the Center for War Gaming permits a civilian contractor to be engaged for the production of war game scenarios. While other services would question the cost effectiveness of such a policy, the Navy apparently feels that the cost is worth the added man-power that would be expended. What has been overlooked, how-ever, is the direct linkage with scenario review and prepara-tion facets of the War College curriculum. Scenarios are a key portion of the last phase of the Strategy course and the force planning portion of the Management course. In both departments the students are instructed in, think about, and write papers on strategic and tactical concepts for Navy

forces, contingency forces and strategic defense. With very little loss of instructional benefit, the senior courses could produce scenarios that could be used for subsequent war games. I am not advocating that the student curriculum be turned into a war gaming support mission, but quick and easy benefits can be obtained by having students prepare at least some of the scenarios that are used throughout the war gaming year. The students would gain the benefit of contributing to real-life problem solutions, and thus the "importance" of their courses would be greatly increased.

Ongoing War Games. The Center for War Gaming performs gaming functions several times every month, yet the seniors of AY 1979-1980 were not involved in the ongoing efforts until February 1980. At that time they received a 60-minute pregame orientation and a 90-minute "hot wash-up" at the end of a CINCLANTFLT game. Great interest was generated during the pregame orientation and it was followed by extensive discussions of strategy, tactics and war concepts in the student study areas during their unstructured time. The less than 3-hour cost to the student curriculum resulted in a quantum benefit for the military services. Of particular note was that the game scenario was a duplicate of one which the students had studied last trimester. I would recommend that each game that is played at the Center for War Gaming be briefed in similar fashion to the student body. If students

also develop scenarios as I have proposed, these briefings
will reinforce the student learning process plus point out
the current problems the Navy is concerned with in a war
gaming arena.   On my own volition I attended the Seacon I
briefing on 2 February and felt that the briefing on the
objectives and outcomes would have specifically benefited
my Navy classmates.

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CHAPTER IV

INNOVATIONS FOR THE FLEET

General. The Navy has probably been the first service
to adopt a program where fleet exercises were "proofed" with
a war game before any lines were cast off and the fleet went
to sea. While this initial effort is commendable, war gaming
for elements of the fleet should be exploited for their
potential benefit.

The Wardroom Board-Game. A simplified but effective
method of training is the board-game. Consider the training
benefits that would accrue if every chief and officer ward-
room in the combatant fleet had a board-game based on the
functional mission of its ship. Would this game be used
extensively by the interested professional personnel? The
answer is clearly--yes!

The professionals are interested in the interaction of
their combatant duties and the "big picture" mission; a
board-game portraying their ship's portion of the mission
gives them a chance to participate and at the same time learn
of their contribution. Board war gaming has undergone a
quantum increase in the civilian sector in the past five
years. New officers frequently bring to the service their
experience with college war gaming clubs and for all of us
the electronic entertainment game has been a "market leader"

11

in adult toys. I am advocating that special types of naval war games be packaged into a simplified board-game format and issued to the fleet. These games will be an excellent teaching vehicle and motivator and would be well received.

Ten years ago the U.S. Army Management School dedicated a 4-hour block for its Executive ORSA course to play Guadal-canal, an amphibious war game. Not only did the students become acquainted with war gaming and simulation techniques during their play, but they exhibited enthusiasm for the game and the WHY of the outcome. Of course, the more they played (on their own time), the better the tactics and the sharper the timing of the force employment. Board games of this type perhaps in air, destroyer/frigate, submarine, and ASW versions would be extremely beneficial to the Navy--and the benefits would accrue from the unstructured time of the officers and NCO's.

The board game should involve and include logistical considerations of critical assets such as missile loads, time-distance factors, search techniques and realistic enemy tactical employment. The Naval War College and the War Gaming Center could develop and produce these board games at very little cost. For those who might doubt the concept, try the technique as an experiment with senior chiefs as players while young petty officers and commissioned officers act as observers. I will almost guarantee that the "observers" will

quickly be demanding to play and all participants will <u>learn</u> from the experience.

"<u>Captain Training</u>." Training of ships' captains is one of the most critical factors that impact on true readiness. The Navy sends its captains to an extensive precommand course but at the same time does not include any gaming techniques to "reawaken" their fleet experience on system employment. It is at the ship captain's level that the real interface begins between ship capabilities and employment tactics. Attendees at precommand courses necessarily have a broad range of experience, from those officers whose last tour was with the fleet to those who have "been away" on Washington assignments for some period of time. A session in a war gaming environment is mandatory to sharpen employment skills.

War gaming is also an ideal technique for introducing new ships' capabilities to the "users." The captain of a new type frigate needs to war game his new command in today's environment before he assumes command or the ship receives its commissioning pennant. I have chosen the frigate as an example. All new weapons and electronic "suits" need to undergo a commander's interaction with a war game simulation to quickly and cheaply portray system and employment limitations as well as the positive system benefits that might modify current employment techniques.

Commodores and task group commanders could also benefit greatly from participating in war games that accurately

13

portray the capabilities and limitations of a newly assigned
ship. While I'm sure that these commanders as well as the
ships' captains will have read voluminous publications about
new capabilities, there is no substitute for seeing an indi-
vidual combat performance and interaction portrayed on a
video display or floor gaming board before taking command
or operational control of the actual hardware. I recommend
that the precommand course include a phase where the com-
manders can interact with a computer war game to sharpen or
enhance their employment skills. The Army uses this tech-
nique successfully for O-5 and O-6 commanders and they report
having received beneficial insight into the capabilities of
their units, as well as requirements for the flow of infor-
mation that is needed to make the myriad of combat decisions
required for successful command in combat.

Staff Training and Plan Testing. Training fleet staffs
and validating plans and command and control systems using
fleet war games are an important aspect of combat readiness.
The many services say they are doing this, but are they
really? Have we diluted participation in the games to the
point where we are no longer actually achieving our stated
goals? Here are some key questions that every leader must
ask himself when he involves his command in a war game:

Am I taking key members of my staff away from
their assigned wartime duty positions to play the Orange
forces?

14

Are key staff officers not participating because
they are involved in critical day-to-day operations and can-
not be spared for the game?

Are "third deputies" acting as principals in the
play of the game?

Are players making decisions based on the plan or
on their experience?

A positive response to any of these questions must key
the leader to one indisputable fact--war games with their
human decision making interaction are impossible to repli-
cate. Decisions made in this environment are based on the
decision makers' values, experience, and skillful use of
leadership, management, and information processing techniques.
Using surrogates to make these gaming decisions does not vali-
date a plan nor does it accurately train subordinates. We
must recognize this and not "fool" ourselves into thinking
we are training the fleet staff. We are actually providing
training only for those personnel who have been selected to
"act" as the decision makers for the game.

Our use of decision making surrogates may be necessary
due to the daily crush of routine readiness business. The
current Center for War Gaming's proposal to provide computer
access terminals at remote locations (Norfolk and San Diego)
is a major step in the right direction. In essence we are
taking the war game to the regular duty station of the

players we want to train and the actual subordinates who will maintain the plot of our combat operations. While it is not my place to remind CINC's that the training of personnel and the testing of plans are major aspects of their force readiness responsibilities, these senior officers must actively participate in their war games. Partial participation is, of course, less acceptable--but it is better than "last day" visits to war game facilities.

I am advocating that the leaders and the principal staff officers participate in a series of realistic war games to test operational plans. Adoption of this technique will enhance the strategic posture of the operational fleet.

Fleet Staff and Task Force Gaming. War games have traditionally been constructed to provide a fixed level of resolution. Accordingly, we either don't play some elements, grossly aggregate likely results, or provide set scenario input from subordinates and superiors. We have "bounded" our games in order to reduce the cost by decreasing the manpower for each game. While it is too much to expect that we could formulate and control a naval war game that included all the participants from the President of the United States down to every ship's captain, the limits on our bounds must be as realistic as possible. Within a fleet it is possible to conduct a war game with only an upper bound on participation of senior officials. This can be accomplished realistically

in our current environment only by using sequential gaming
techniques. Here is a feasible sequence:

(a) Fleet commander and his staff review current
plan and issue "execute" instructions along with necessary
plan modifications. They then return to their peacetime
duties.

(b) Task force commanders receive plans and begin
execution until first enemy contact is established. At first
contact they return to their peacetime duties.

(c) Fleet staff reconvenes in its operations center
and receives task force reports that have been stored in the
computer in sequential order. Fleet commander issues new
orders based on his estimate of the situation and specifies
what near-term tactical activities/events he perceives as
critical to accomplishment of his force mission. He then
returns to his peacetime duties.

(d) Task force commanders and captains of subordi-
nate ships review new instructions, if any, and then proceed
to war gaming the conflict from the first enemy contact until
they reach a point where a critical event, as specified by the
fleet commander, occurs. They then return to their peacetime
duties and the fleet staff begins the iteration process again.

This sequential technique will release some of the over-
burden that results from operating requirements competing
with participation requirements in a war game. The procedure

is still costly in terms of time but the time lengths of the steps of the sequence can be varied to match the time available. If the fleet staff training games and the computer-assisted games used for training ship captains and commanders are properly constructed, a sequential game is easily formulated by the addition of an output system integration routine overlayered with an appropriate command and control communications system.

CHAPTER V

INNOVATIONS FOR NAVY RESEARCH

General. Researchers are traditionally the advocates
of computer simulations. They use simulations both to design
systems and to determine their overall effectiveness, but
they only infrequently allow the user to interact with their
simulations to make his decisions. The presence of this
human in the system prevents the statistical replication
that is considered so necessary for research analysis. Rec-
ognizing that almost all Navy research will result in a
system that, when placed in the fleet, will be under human
control, a sterile analysis--which does not include human
interface--should be generally unacceptable for the Navy.

System Designers. The Navy has already approached a
high level of sophistication by exposing its designers to
war gaming. On the 2nd of February 1980, I attended the
"inbrief" for SEACON I. The game employed new weapons with
specifications that would be feasible for the 1990 time
frame. Also in attendance during the game, as observers,
were civilian weapons contractors. These contractors could
see the decision process in action and were urged to ask the
game participants why they made the decisions they did. This
approach is novel and recognizes that these designers usually
can't be out on a ship's bridge during actual operations. I

19

laud the Navy Materiel Command for this effort as it is truly
an innovative use of war gaming. I doubt that the other serv-
ices have used this technique--but they should! The designers
who attend these games come to appreciate more deeply the
Navy decision makers' problems and thought processes for solu-
tions, with the result that their research is more fruitful
for the Department of the Navy.

Simulation Designers. Simulations continue to grow in
size and complexity but, more often than not, the validation
of the model is done in only a cursory manner with most vali-
dation efforts directed toward mathematical correctness and
repetition of results of common input. Usually missing is a
user validation where a group of users sit down and interact
with a manual version of the model to insure that the analyt-
ical steps match plausible human decision making criteria.
Designers of these simulations must request, and the Navy
must demand, that this "fleet user" validation take place
before production runs are made. Navy user personnel should
also assist in the interpretation of results of production
runs. Often the "fleet user" will be able to provide tacti-
cal rationale correlation with the results that would other-
wise be lost within the system.

All Researchers. Bring your machine simulation exper-
tise and combine it with the experience of manual gaming in
the manner I have recommended in Chapter II. Teamwork will

result in a better product for the Navy--which, after all,

is your final objective.

CHAPTER VI

INNOVATIONS FOR INTERSERVICE COORDINATION

During the CINCLANTFLT briefing on 22 February 1980,
it was announced that, for the <u>first</u> time in recent memory,
a war game involving an amphibious task force would be
played all the way to the Marine objective area. This was
feasible because the Marine Corps had brought its analytical
machine capability from Quantico and co-located it with the
Navy system at Newport. The Navy gamers and their machine
system would simulate the contingency mission scenario from
the port of embarkation to the beach. Then the Marine offi-
cers and their equipment would carry the battle from the
beach to the final security of the Marine objectives. The
integration of effort is outstanding but should be the normal
"modus operandi" rather than the exception. Those portions
of the scenario which include the employment of land-based
air and AWACS should be gamed by Air Force personnel using
their simulation programs. All services need to interact in
war games where missions cross service "lines."

I recommend that the Navy "take the lead" in establishing
interservice coordination for war gaming techniques. Other
than the JCS Studies Analysis and Gaming Agency, I think the
Navy's Center for War Gaming is the only central emphasis
point for war gaming of all the services. The other services

have their gaming and simulation capabilities fragmented to different agencies by functional area. A Navy lead in bringing the services together in a conference to exchange "state of the art" information on simulation and gaming techniques would have exceptional benefit for the Department of Defense as a whole.

CHAPTER VII

CONCLUSIONS

War games can never perfectly represent a real conflict.
They can, however, be designed to accurately portray the out-
comes of tactical and strategic decisions and thus can pro-
vide valuable insight on "possible solutions to complex
problems" for the player-decision makers.

A dedicated and direct coupling of analytical simulation
advocates with those who espouse a human decision maker
gaming approach will result in an amalgamation that leads to
a single war gaming discipline. This single discipline will
provide a more accurate portrayal of armed conflicts with
resultant gain in confidence by the decision makers.

The War College curriculum will be strengthened if gaming
capabilities are readily available for students to use during
their unstructured time. Student efforts in scenario formu-
lation and force planning will be more meaningful if the
scenarios are subsequently gamed at the Center for War Gaming.
Positive learning benefit is also available for the students
if they are briefed on the objectives and outcomes of all war
games played at the Center during the academic year.

Training within the fleet will be enhanced if simple
board games are issued to the wardrooms and air stations for
use by mid-level leaders during their unstructured time. A
war gaming phase added to the Navy's precommand course will

24

familiarize ship captains with the capabilities of new equipment and reinforce their previous experience with different system deployment options. Task group commanders will also benefit from war gaming employment of their forces to review interaction of major systems. Staff training and testing of operational plans are facilitated and increased in value if war games are used to train the actual decision makers and not performed with "ad hoc" groups who serve as surrogate decision makers. A trained fleet staff gaming with subordinate task force players down to the ship captain level in a sequential war game can validate operational plans without a complete disruption of peacetime duty responsibilities and requirements.

Continuation of the program that permits Navy system designers to observe war game decision makers "on the scene" should be "exported" to other services for similar gains in researcher-user interaction. A concerted interaction of users and simulation designers will produce a better/more reasonable validation of system models, thus increasing the decision makers' confidence in production results. Research personnel should also take the lead in combining their expertise in machine simulation with man decision-maker gaming.

Finally, the Navy has taken the lead in interservice coordination and should continue to push for more interaction, using their Center for War Gaming as a facility for the exchange of war gaming techniques.

Armed conflict is a complex problem to model but the expertise and knowledge are available to use the expansive machine capability that is currently programmed. Adoption of any of the innovations presented in this paper would enhance our ability to structure and train for employment a defensive force which is highly capable of protecting the vital interests of the United States of America.

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